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## Novelties in Neotropical Lauraceae

*Henk van der Werff*

Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri 63166-0299, U.S.A.

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**ABSTRACT.** Intensive collecting efforts during recent years have resulted in a large number of Lauraceae collections. Attempts at their identification have shown that many Lauraceae species are still undescribed. In this contribution ten species are described, and one may expect articles describing additional species at regular intervals.

***Aiouea grandifolia*** van der Werff, sp. nov. TYPE: Peru. Depto. San Martín: Distr. Tocache Nuevo, Fundo Geroglífico del Mr. Luis Ludena, alt. 400 m, tree, 20 m, *Schunke Vigo 8109* (fl) (holotype, MO; isotype, U). Figure 1.

Arbor, 20 m. Ramuli parum angulati vel rotundati, glabri, fistulosi. Gemma terminalis pubescens. Folia alterna, firme chartacea, 20–35 × 10–17 cm, elliptica, basi et apice acuta vel obtusa, supra glabra, subtus dense punctata, glabra vel pilis adpressis praedita, nervis lateralibus 5–7; costa supra impressa, nervis lateralibus immersis, costa nervisque subtus prominenter elevatis. Petioli 2.4–5.1 cm, canaliculati, glabri. Inflorescentiae secus brachyblastos dispositae, ad 10 cm longae, basi sparse puberulae, parte distali glabrescentes. Pedicelli glabri, 2–4 mm longi. Flores glabri. Tepala 6, aequalia, ovata, 1 mm longa, stamina 6, 2-locellata, introrsa, ca. 1 mm longa, filamentum paullo ultra locellos productum, staminodia 6, ad verticillos III et IV referentia; glandulae basi staminodiorum verticilli III praesentes. Ovarium globosum, glabrum, 1.7 mm diametro; tubo florali basi glabro, ad orificium dense pubescente. Infructescentia ad 18 cm longa; fructus ellipsoideus, 2.8–1.4 cm, cupula ca. 1.5 cm lata, 0.8 cm longa.

Tree, to 20 m tall. Twigs slightly angular or rounded, glabrous, fistulose. Terminal bud pubescent. Leaves alternate, firmly chartaceous, 20–35 × 10–17 cm, elliptic, base and tip acute or obtuse, upper surface glabrous, lower surface densely gland-dotted and glabrous or with varying amounts of very short, appressed hairs; lateral veins 5–7 on each side; midrib impressed on upper surface, lateral veins and reticulation immersed; midrib and lateral veins strongly raised on lower surface, tertiary venation slightly raised. Petioles 2.4–5.1 cm long, canaliculate, glabrous. Inflorescences in axils of deciduous bracts, to 10 cm long, grouped along short (to 1 cm long) leafless shoots, sparsely puberulous near the base, the distal parts becoming glabrous, bracts not present at anthesis. Pedicels glabrous, 2–4 mm long. Flowers glabrous. Tepals 6, equal, erect at

anthesis, shorter than the floral tube, ovate, ca. 1 mm long, persistent, but not enlarged in young fruiting stage. Stamens of whorls I and II (outer six stamens) fertile, 2-celled, introrse, ca. 1 mm long, the filament slightly prolonged beyond the locelli, about as long as the anther, sparsely puberulous near the base. Whorl III staminodial (occasionally a small locellus present), ventrally densely pubescent, ca. 1 mm long, each stamen with two large, globose glands attached slightly above the base. Staminodia of whorl IV present, stipitiform, the lower half densely pubescent, ca. 0.8 mm long. Ovary globose, glabrous, 1.7 mm diam., style slender, 0.7 mm long; floral tube near base glabrous, becoming densely pubescent near the orifice. Infructescence to 18 cm long, fruit ellipsoid, 2.8 × 1.4 cm, cupule cup-shaped, ca. 1.5 cm wide, 0.8 cm high, tepals at maturity of fruit worn off.

*Flowers:* August; *fruits:* January–June.

The following sterile collections very likely represent this species as well: Colombia. Amazonas: Pto. Nariño, *Rudas et al. 1726* (MO) and Brazil. Amazonas: Reserva Florestal Ducke, *Nascimento 330* and *Coelho s.n. = INPA 42219*.

*Aiouea grandifolia*, only known from the lowlands of eastern Peru, can be readily recognized by its large leaves, strongly raised midrib on lower leaf surface, and fistulose twigs. The only other *Aiouea* species with large leaves is *A. angulata*, known from one Colombian collection. This species has strongly angled twigs, nine fertile stamens, attenuate or acute leaf bases, and lacks leafless short shoots that carry inflorescences. In Renner's (1982) revision of *Aiouea*, *A. grandifolia* will key to three species that have only stamens of whorls I and II fertile. These species differ from *A. grandifolia* in numerous details: *A. saligna* has lanceolate leaves and occurs in southern Brazil; *A. trinervis* is a shrub or small tree in cerrado with coriaceous leaves and pubescent twigs; and *A. laevis* is an Amazonian tree with hirsute flowers, larger, more intricately branched inflorescences, and smaller flowers.

Inflorescences grouped along leafless short shoots are uncommon among neotropical Lauraceae, but occur in several other *Aiouea* species (*A. benthamiana*, *A. guianensis*, *A. maguireana*, *A. myristi-*

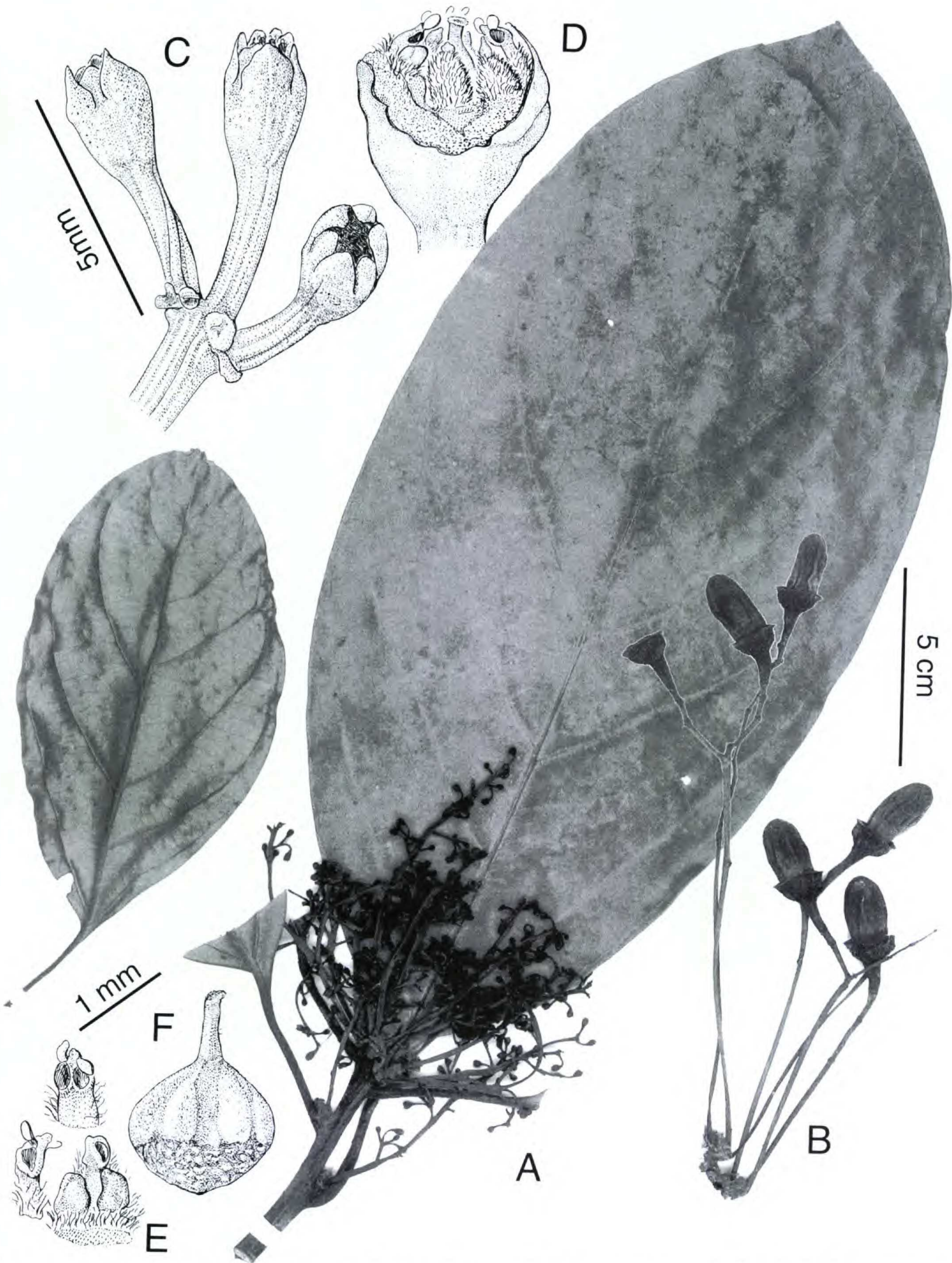


Figure 1. *Aiouea grandifolia* van der Werff. —A. Habit. —B. Infructescence. —C. Detail of inflorescence. —D. Flower. —E. Stamens. —F. Pistil.

*coides*, and *A. saligna*). Whether other *Aiouea* species have persistent tepals needs further investigation. The aspect of *A. grandifolia* is quite unlike the other *Aiouea* species. If one disregards the two-celled stamens, one cannot help but notice a strong

resemblance with the recently described *Cinnamomum napoense* van der Werff from Amazonian Ecuador: both have hollow stems, inflorescences clustered along leafless short shoots, a similarly strongly raised costa on lower leaf surface, and strongly gland-

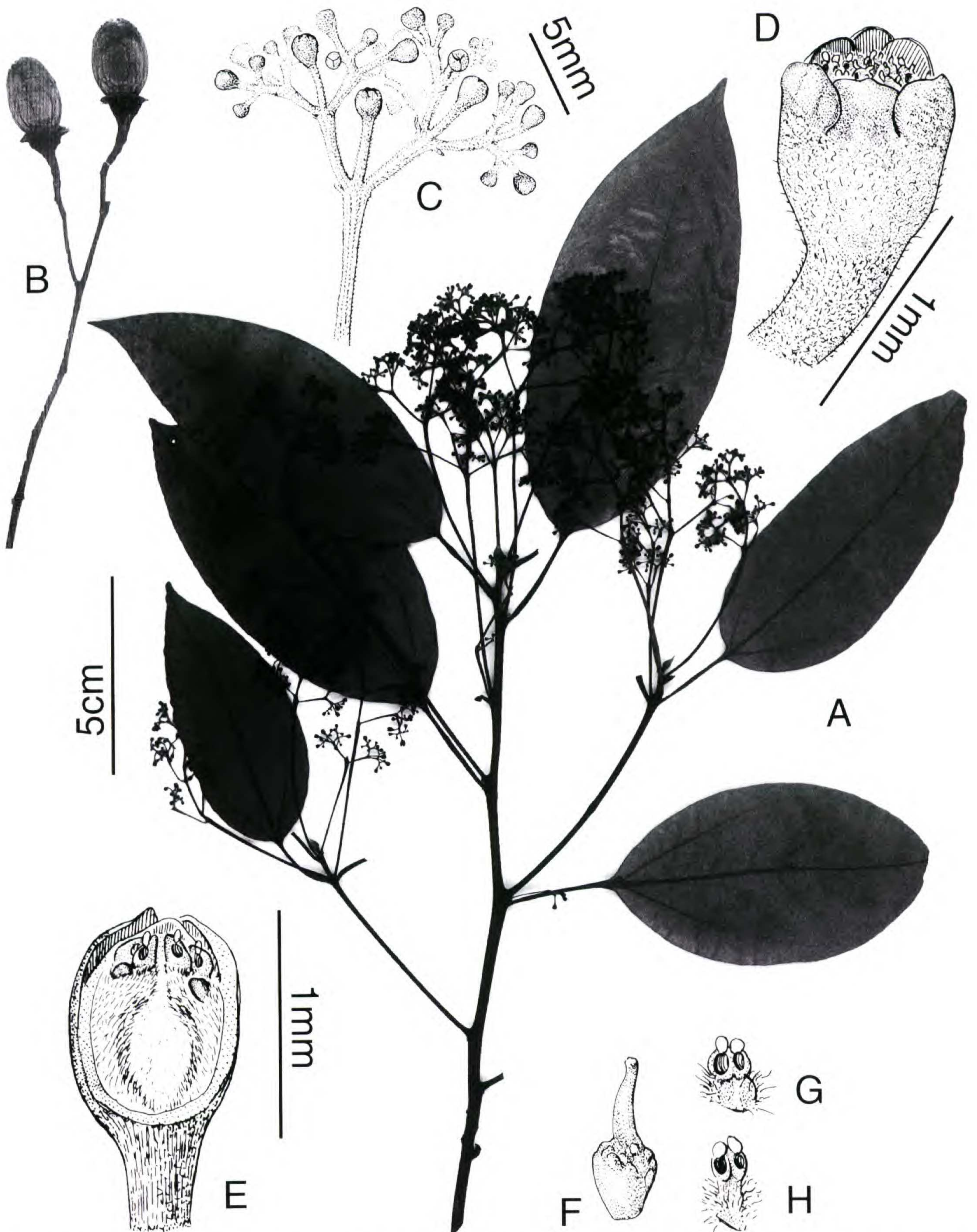


Figure 2. *Aiouea longipetiolata* van der Werff. —A. Habit. —B. Fruits. —C. Part of inflorescence. —D. Flower. —E. Flower in cross section. —F. Pistil. —G, H. Stamens.

dotted lower leaf surfaces. Although the two can be easily identified when flowers are present, sterile or fruiting specimens are hard to separate. *Aiouea grandifolia* has relatively wider, firmer leaves than *C. napoense*; leaves in *A. grandifolia* are often somewhat shiny, but usually opaque in *C. napoense*.

*Paratypes*. PERU. **Loreto**: Maynas, Explorama Reserve at Indiana, Gentry et al. 65760 (fr) (MO), Gentry et al. 54654 (fr) (MO), Gentry et al. 31455 (fr) (MO), Grandez et al. 4109 (fr) (MO), Grandez et al. 3834 (fr) (MO), Vásquez & Ayala 13408 (fr) (MO); Vásquez et al. 13469 (fr) (MO). **Madre de Dios**: Manu National Park, Cocha Cashu uplands, Nuñez et al. 14592 (st)

(MO); Tambopata, Explorer's Inn tourist camp, *Gentry et al.* 45938 (st) (MO), *Gentry et al.* 51097 (st) (MO), *Gentry et al.* 51491 (st) (MO).

***Aiouea longipetiolata*** van der Werff, sp. nov.

TYPE: French Guiana. Saül: La Fumée West, ca. 300 m, tree, 35 m, *Mori et al.* 20758 (fl) (holotype, MO). Figure 2.

Arbor, ad 35 m. Ramuli parum angulati, minute tomentelli, glabrescentes. Folia alterna, firme chartacea, 10–17 × 4–7.5 cm, elliptica vel ovata, basi obtusa vel rotundata, apice acuta, supra glabra, subtus pilis parvis, brunneis praedita, nervis lateralibus 3–5 utroque costae latere, basilibus quam distalibus magis evolutis, costa supra impressa, subtus elevata; nervis supra immersis, subtus elevatis, reticulatione supra immersa, subtus paullo elevata. Petioli 2.7–3.5 cm longi, canaliculati. Inflorescentiae axillis foliorum ortae, 8–14 cm longae, tomentellae. Pedicelli ad 4(5) mm longi. Flores basi paullo pubescentes, apicem versus glabrescentes, 1.5–2 mm longi. Tepala 6, sub anthesi erecta, tubo florale perbreviora, post anthesin omnia basibus unitis dehiscentia. Stamina 9, 2-locellata, 6 exteriora introrsa, 3 interiora lateralibus; stamina interiora filamentum pubescentia; staminodia 3, basi pubescentia. Ovarium glabrum, globosum, ca. 1.2 mm longum, stylo distincto, ca. 0.7 mm longo; receptaculum intus dense pubescens. Fructus ellipsoideus, 3 × 1.7 cm, cupula vadosa, ca. 1.5 cm diametro, sensim in pedicello attenuata.

Tree, to 35 m, with buttresses. Twigs slightly angular, solid, minutely brown-tomentellous, becoming glabrous with age. Terminal bud densely light-brown tomentellous. Leaves alternate, firmly chartaceous, 10–17 × 4–7.5 cm, elliptic or ovate, base obtuse or rounded, tip acute, the upper surface glabrous, lower surface with scattered, minute (< 0.1 mm), brown hairs, the margin cartilaginous, lateral veins 3–5, the lowest pair stronger developed than the upper ones, midrib slightly impressed on the upper surface, lateral veins and reticulation immersed, midrib and lateral veins raised on lower surface, reticulation slightly raised. Petioles 2.7–3.5 cm long, canaliculate, with same indument as twigs. Inflorescences in axils of leaves, 8–14 cm long, paniculate, the lateral branchlets 3–4 times cymosely branched, brown-tomentellous. Pedicels to 4(5) mm long, tomentellous. Flowers at the base slightly tomentellous, otherwise glabrous, 1.5–2 mm long. Tepals 6, erect at anthesis, much shorter than the floral tube, ca. 0.5 mm long, 1 mm wide, glabrous on both surfaces, united at the base and falling as a unit with the stamens in old flowers. Stamens 9, all 2-celled, the outer six opening introrse, the inner three lateral; outer stamens ca. 0.5 mm long, the filament slightly prolonged beyond the anther cells, dorsally near the base with some hairs, otherwise glabrous; inner three stamens ca. 0.7 mm long, ventrally densely pubescent, in some flowers

appearing staminodial, glands globose, sessile, partly covered by the pubescence; staminodia 3, stipitate, densely pubescent. Ovary glabrous, ± globose, ca. 1.2 mm long, style distinct, ca. 0.7 mm long; receptacle deep, densely pubescent inside. Fruit ellipsoid, 3 × 1.7 cm, cupule very shallow, ca. 1.5 cm diam., gradually narrowed into the pedicel.

Flowers: August–November; fruits: March.

*Aiouea longipetiolata* is only known from French Guiana. In Renner's (1982) treatment of *Aiouea* for the *Flora Neotropica* it will key to *A. impressa* because of its slightly impressed costa, or *A. tomentella* because of the dense pubescence of the receptacle and of filaments of the inner three stamens and staminodia. However, *A. impressa* differs in its glabrous inflorescences, smaller, glabrous leaves with acute base, and more intricately branched inflorescences with smaller flowers. *Aiouea tomentella* is a poorly known species; a type fragment I have seen has a densely tomentellous lower leaf surface and is not tripliveined. The aspect of *A. longipetiolata* is characteristic, with its long petioled leaves, obtuse leaf bases, and tripliveined leaves. This aspect, in combination with the indument of the lower leaf surface, makes it possible to identify sterile specimens with confidence.

Some specimens of the species were distributed as *Phoebe cinnamomifolia* (HBK) Nees and are probably filed under this name in other herbaria. *Phoebe cinnamomifolia* has four-celled anthers, and the tepals are persistent in the fruiting stage.

Paratypes. FRENCH GUIANA. Saül: La Fumée, *Mori & Boom* 14902 (fl) (MO), *Mori & Boom* 15238 (fl) (MO), *Mori & Pipoly* 15413 (fr) (MO); Village Wayampi Trois-Sauts, *Prévost & Sabatier* 2801 (buds) (MO).

***Aniba heterotepala*** van der Werff, sp. nov. TYPE:

Peru. Loreto: Maynas, km 44 of road Iquitos–Nauta, property of CPI, Comité de Reforestación Iquitos, elev. 150 m, tree 26 m, fls. yellowish, Dec. 1988, *Vásquez & Jaramillo* 11370 (holotype, MO; isotypes, AMAZ, F, G, HBG, NY, US). Figure 3.

Arbor, ad 26 m. Ramuli teretes, brunneo-tomentelli, glabrescentes. Gemma terminalis parva, tomentella. Folia alterna, subcoriacea, 10–27 × 3.5–9 cm, base obtusa, raro acuta vel rotundata, apice acuta vel acuminata, supra glabra, subtus papillosa, pilis parvis adpressis praedita; nervis lateralibus 7–11 utroque latere, in dimidio distale brochidodroma; costa nervisque supra parum impressis, reticulatione immersa; subtus costa nervisque elevatis, reticulatione paullo elevata. Petioli 1–2 cm longi. Inflorescentiae ad apices ramulorum aggregatae, in axillis bractearum (raro in axillis foliorum) ortae, tomentellae, 5–15 cm longae. Pedicelli 3–4 mm longi, tomentelli. Flores 2–3 mm longi, ca. 2.5 mm lati, sensim in pedicellis attenuati.

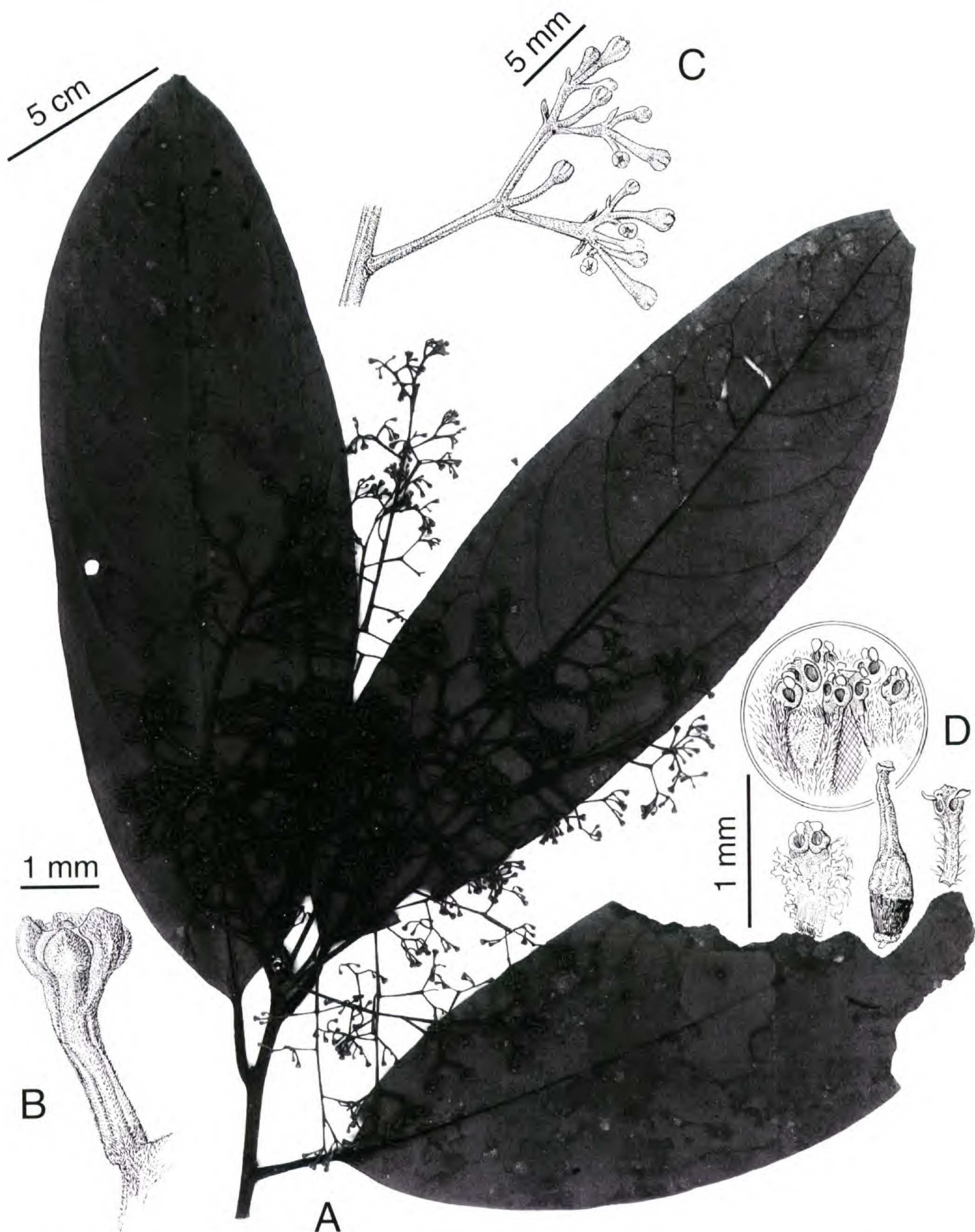


Figure 3. *Aniba heterotepala* van der Werff. —A. Habit. —B. Flower. —C. Part of inflorescence. —D. Stamens and pistil.

Tepala 6, inaequalia, tres exteriora ca.  $1.1 \times 1.4$  mm, plus minusve erecta, tres interiora longiora et latiora, tertia parte distale incurvata; stamina 9, 2-locellata, 6 exteriora locellis introrsis, filamentis antheris angustioribus, dense lanato-pubescentibus; tres interiora glabra, locellis extrorsis, basi filamentorum duobus glandulis magnis praedita; staminodia nulla; pistillum glabrum; tubus floralis dimidio inferiore glaber et dimidio superiore pubescens vel omnino glaber. Fructus ignotus.

Tree, to 26 m tall. Twigs terete, brown-tomentellous, glabrescent with age. Terminal bud small, tomentellous. Leaves alternate, subcoriaceous,  $10-27 \times 2.5-9$  cm, the base obtuse (rarely acute or rounded), apex acute or acuminate, upper surface glabrous, lower surface papillose, with small, scattered, appressed hairs, lateral veins 7-11 on each

side, arching upwards and loop-connected in the upper half of lamina, midrib and lateral veins slightly impressed on upper surface, tertiary venation immersed, midrib and lateral veins raised on lower surface, tertiary venation less so. Petioles 1–2 cm long. Inflorescences usually clustered at the tips of branches in axils of deciduous bracts, rarely in axils of leaves, tomentellous, 5–15 cm long, paniculate, flowers arranged in cymes, bracts lacking at anthesis. Pedicels 3–4 mm long, tomentellous. Flowers greenish yellow, 2–3 mm long, ca. 2.5 mm wide, the base gradually narrowed into the pedicel, tepals 6, unequal, the outer three ca.  $1.1 \times 1.4$  mm,  $\pm$  erect, inner three longer and wider, upper third incurved, tomentellous outside, glabrous inside, stamens 9, all 2-celled, outer six with the cells introrse, the cells opening upwards and the connective slightly prolonged beyond the anther cells, filaments densely woolly-pubescent, narrower than anthers; inner three stamens glabrous, the cells extrorse, with two large globose glands at base of filaments, staminodes lacking; pistil glabrous, ca. 2 mm long, the ovary gradually narrowed into the style; floral tube with lower half glabrous and upper half pubescent or entirely glabrous. Fruit unknown.

*Aniba heterotepala* is only known from the vicinity of Iquitos, Peru. Diagnostic is the combination of the papillose lower leaf surface, unequal tepals, and glabrous ovary. In two of the known collections the floral tube was partly pubescent (including the type), while in the other two it was entirely glabrous. The generally obtuse leaf bases are also a useful character. It is rather remarkable that no fruiting collections are known from this species because the leaf bases, the slightly impressed veins on the upper surface, and the loop-connected lateral veins are fairly good vegetative characters.

In the recent revision of *Aniba* (Kubitzki, 1982), *A. heterotepala* will key to *A. cylindrica* because of its papillose lower leaf surface and glabrous gynoecium. However, *A. heterotepala* differs in having unequal tepals and broader leaves, usually with an obtuse base.

*Paratypes*. PERU. **Loreto**: Puerto Almendras, *Croat 19010* (fl) (AMAZ, MO). **Maynas**: Estación Biológica Río Blanco, elev. 150 m, *Vásquez et al. 6752* (fl) (AMAZ, MO); Puerto Almendras, elev. 120 m, *Vásquez & Jaramillo 6862* (fl) (MO, AMAZ), *Grandez & Jaramillo 1851* (AMAZ, MO).

***Aniba pilosa*** van der Werff, sp. nov. TYPE: Ecuador. Morona-Santiago: along road Mendez-El Limón, elev. 800 m, *van der Werff & Palacios 10430* (holotype, MO; isotypes, AAU, GB, NY, QCNE, QRS, US). Figure 4.

Arbores ad 10 m. Ramuli angulati, vetustiores teretes, dense fusco-tomentelli. Folia alterna, chartacea, 15–22  $\times$  7–12 cm, (late) elliptica, basi obtusa vel rotundata, raro acuta, apice breviter acuminata, acumine ad 2 cm longo, supra glabra, subtus papillosa, pilosa, pilis plerumque erectis, pagina inter pilis manifesta; nervis lateralibus 8–12 utroque latere, venatione supra immersa, subtus costa nervisque elevatis, reticulatione paullo elevata. Petioli 1–2 cm longi, indumento ramulis similes. Inflorescentiae axillares, paniculatae, 10–24 cm longae, fusco-tomentellae. Pedicelli ad 1 mm longi, flores virides, fragrant, ad 2.5 mm longi. Tepala 6, aequalia, fusco-tomentella, intus glabra, crista mediana praedita, late ovata, ca. 1 mm longa. Stamina 9, 2-locellata, 6 exteriora locellis laterali-apicalibus, filamentis quam antheris angustioribus; 3 interiora locellis extrorsis, filamentis antheris crassitudine aequantibus, glandulis duabus praeditis; omnibus filamentis lanatis. Ovarium anguste ellipsoideum, dimidio inferiore glabrum, dimidio superiore pubescens. Tubus floralis intus glaber. Cupula infundibuliformis, ad 2 cm longa; fructus ellipsoideus, 2.5  $\times$  2 cm.

Tree, to 10 m. Twigs angular, becoming terete, densely brown-tomentellous. Terminal bud brown-tomentellous. Leaves alternate, chartaceous, 15–22  $\times$  7–12 cm, (broadly) elliptic, the base obtuse to rounded, rarely acute, the tip shortly acuminate, the acumen to 2 cm long, but frequently broken off, upper surface glabrous, lower surface papillose, pilose, the hairs mostly erect, the leaf surface visible between the hairs; lateral veins 8–12 per side, venation immersed on upper surface, midrib and lateral veins raised on lower surface, tertiary venation weakly raised. Petioles with similar indument as twigs, 1–2 cm long, weakly canaliculate. Inflorescences in axils of leaves, paniculate, 10–24 cm long, brown-tomentellous, many-flowered. Pedicels ca. 1 mm long, gradually widened into the floral tube. Flowers green, fragrant, ca. 2.5 mm long. Tepals 6, equal, brown-tomentellous, ca. 1 mm long, broadly ovate, with a central ridge, this more pronounced on the outer 3 tepals, the margin ciliate, inner surface glabrous. Stamens 9, all 2-celled, the outer six with the cells lateral-apical, the connective protruding past the cells, the filament narrower than the anther; inner 3 stamens with cells extrorse, the filament as wide as the anther, with two rather large globose glands near the base; filaments of all stamens woolly pubescent. Ovary narrowly ellipsoid, the lower half glabrous, upper half densely pubescent, gradually narrowed into the style. Floral tube glabrous inside. Cupule funnel-shaped, thin-walled, to 2 cm long (including the swollen pedicel), usually split in 3 or 4 by the growing fruit; fruit ellipsoid, 2.5  $\times$  2 cm.

*Aniba pilosa* can be readily identified by its pilose lower leaf surface. Most *Aniba* species have a (nearly) glabrous lower leaf surface; a few have a tomentellous lower leaf surface, but these species have

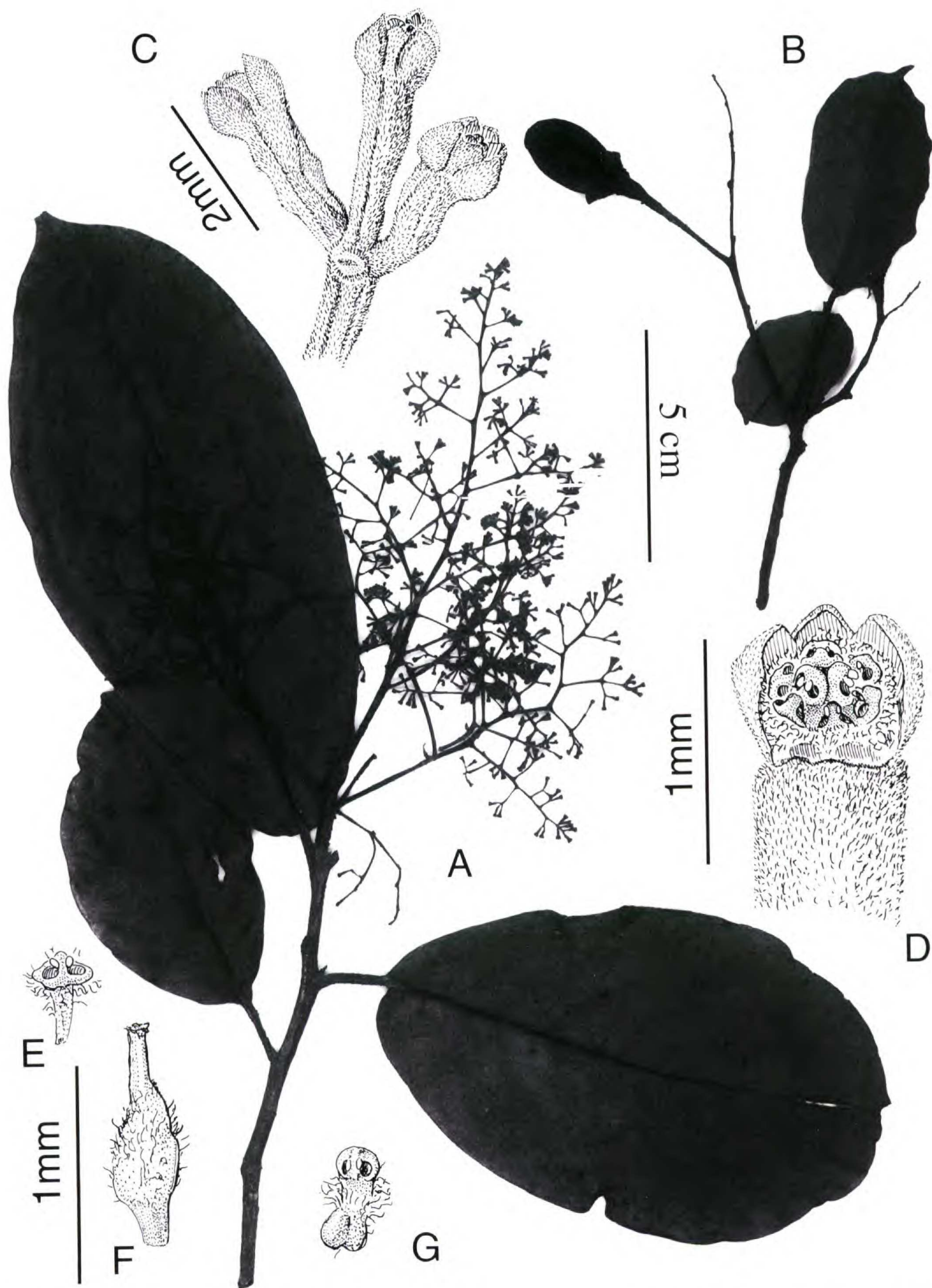


Figure 4. *Aniba pilosa* van der Werff. —A. Habit. —B. Infructescence. —C. Detail of inflorescence. —D. Flower with tepals removed. —E. Outer stamen. —F. Pistil. —G. Inner stamen.

usually clustered, not alternate leaves. In Kubitzki's (1982) key of *Aniba*, *A. pilosa* will key to *A. permollis* due to its papillose leaves and pilose indument. However, *A. permollis* has the lower leaf surface

completely covered by its tomentellous-tomentose indument and the tertiary venation is not raised on the upper leaf surface; in *A. pilosa* most of the lower leaf surface is visible between the hairs and

the reticulation is weakly raised on the upper leaf surface. Moreover, *A. pilosa* has wider leaves with more rounded leaf bases. Both species have a striking, dark brown indument. Other useful characteristics of *A. pilosa* are the shape of the outer stamens, with the filament narrower than the anther and the funnel-shaped, frequently split cupules. *Aniba cinnamomiflora*, from Venezuela, has a similar cupule; it differs from *A. pilosa* in indument, in its much smaller inflorescences and in its narrower leaves.

*Paratype.* ECUADOR. **Morona-Santiago:** road Mendez-El Limón, tree in pasture, 500 m elev., *van der Werff & Palacios 10432* (fl) (AAU, MO, QCNE).

***Aniba vulcanicola*** van der Werff, sp. nov. TYPE: Ecuador. Napo: Archidona, southern slope of volcano Sumaco, km 31 road Hollin-Loreto, elev. 1,200 m, tree, 15 m, Nov. 1989 (fls), *Palacios 4753* (holotype, MO; isotypes, AAU, GB, HBG, NY, QCNE, US). Figure 5.

Arbor, 15 m. Ramuli teretes, lenticellati, hornotini tomentosi, annotini glabri. Gemma terminalis tomentosa vel dense adpresse pubescens. Folia ad apices ramulorum congesta, cernua, subcoriacea, 10–25 × 5–10 cm, elliptica vel elliptico-obovata, basi et apice acuta, utrinque glabra vel perjuvenalia adpressa pubescentia, nervis lateralibus 10–14 utroque latere, in dimidio distale brochidodromis, supra costa nervisque immersis, reticulatione obscura; subtus costa nervisque elevatis, reticulatione paullo elevata. Petioli 1–2 cm longi, glabri, canaliculati. Inflorescentiae secus ramulos hornotinos ex axillis bractearum ortae, paniculatae, tomentosae, 7–15 cm longae. Pedicelli ad 2 mm longi. Tepala 6, aequalia, erecta, intus sparse pubescentia, late ovata, ca. 1.5 × 1.3 mm. Stamina 9, 2-locellata, locellis rimis vel valvis minutis aperientibus, 6 exteriora ad 1 mm longa, intro curvata, locellis lateralibus vel laterali-apicalibus, anthera quam filamentum pubescente latiore; 3 interiora erecta, ca. 1 mm longa, locellis apicalibus, filamentis basi glandulis duabus praeditis. Pistillum glabrum, tenue. Receptaculum pubescens, praesertim dimidio superiore. Fructus ignotus.

Tree, 15 m. Twigs terete, lenticellate, tip brown-tomentose, older parts soon glabrous. Terminal bud densely tomentose or appressed pubescent. Leaves clustered at tips of branches, drooping, subcoriaceous, 10–25 × 5–10 cm, elliptic to elliptic-obovate, base and apex acute, glabrous on both surfaces, or very young leaves with some appressed pubescence on lower surface, lateral veins 10–14 on each side, arching upwards and brochidodromous in the distal half of lamina; costa and lateral veins immersed on upper surface with tertiary venation not visible; costa and lateral veins raised on lower surface, the tertiary venation slightly raised. Petioles 1–2 cm long, glabrous, canaliculate. Inflorescences in axils of deciduous bracts on young growth above the leaves, paniculate, brown-tomentose, 7–15 cm

long. Pedicels very short, to 2 mm long. Flowers greenish, tomentose-tomentellous. Tepals 6, equal, inner surface pubescent, broadly ovate, ca. 1.5 × 1.3 mm. Stamens 9, all 2-celled, the cells opening by slits or minute valves, the outer six ca. 1 mm long, the cells lateral or lateral-apical, the outer six ca. 1 mm long, curved inward, the anther broader than the pubescent filament; inner stamens erect, ca. 1 mm long, the filaments with two globose glands near the base, the cells virtually apical. Pistil slender, glabrous. Receptacle pubescent inside, especially the upper part. Fruit unknown.

*Aniba vulcanicola* is related to the other *Aniba* species with large, clustered leaves, such as *A. hostmanniana* and *A. williamsii*. It differs from those species in its (nearly) glabrous leaves, relatively long petioles, tomentose inflorescences, the acute leaf bases, and the relatively few lateral veins. The peculiar, almost slitlike opening of the locelli occurs also in the related species, although these species do not have the anther cells in a nearly apical position. The related species are only known from lowlands, up to 300–400 m elevation, while *A. vulcanicola* occurs at 1,200 m elevation.

In Kubitzki's (1982) key of *Aniba*, *A. vulcanicola* will key to a group of four species with glabrous, clustered leaves and ventral-lateral locelli. From *A. bracteata* and *A. terminalis* it differs in leaf base (not abruptly rounded nor cuneate); both *A. affinis* and *A. citrifolia* have smaller, less clearly clustered leaves, lack a prominently raised midrib on the lower leaf surface, and have a sparser indument on the inflorescences.

***Licaria applanata*** van der Werff, sp. nov. TYPE: Ecuador. Pichincha: Reserva Río Guajalito, near Chiriboga, along old road Quito-Sto. Domingo, 1,850 m, *van der Werff et al. 12194* (holotype, MO; isotypes, AAU, GB, HBG, K, NY, P, QCNE, QRS, US). Figure 6.

Arbor ad 30 m. Ramuli teretes, glabri vel minute adpresse pubescentes. Gemma terminalis albida, adpresse pubescens. Folia alterna, firme chartacea vel coriacea, 11–20 × 4–8 cm, elliptica vel late elliptica, basi acuta vel obtusa, apice acuta vel acuminata, supra nitentia, glabra, subtus glabra vel pilis parvis praedita, nervis lateralibus 5–6 utroque latere. Petioli nigri, (sub) glabri, 1 cm longi. Inflorescentiae axillares, ad 8 cm longae, subtiliter pubescentes, flores glabri, depressi, in sicco 4–5 mm diam., in alcohole conservati 6–6.5 mm diam. Tepala 6, utrinque glabra, exteriora quam interiora minora. Stamina 3, 2-locellata, locellis apicalibus, tepala versus aperientibus, plus minusve coalita, irregulariter obconica, apice plana. Staminodia 6, (late) ligulata. Glandulae magnae, staminodiis alternantes. Pistillum glabrum, receptaculo glabro. In fructu pedicelli incrassati, sensim in cupulam



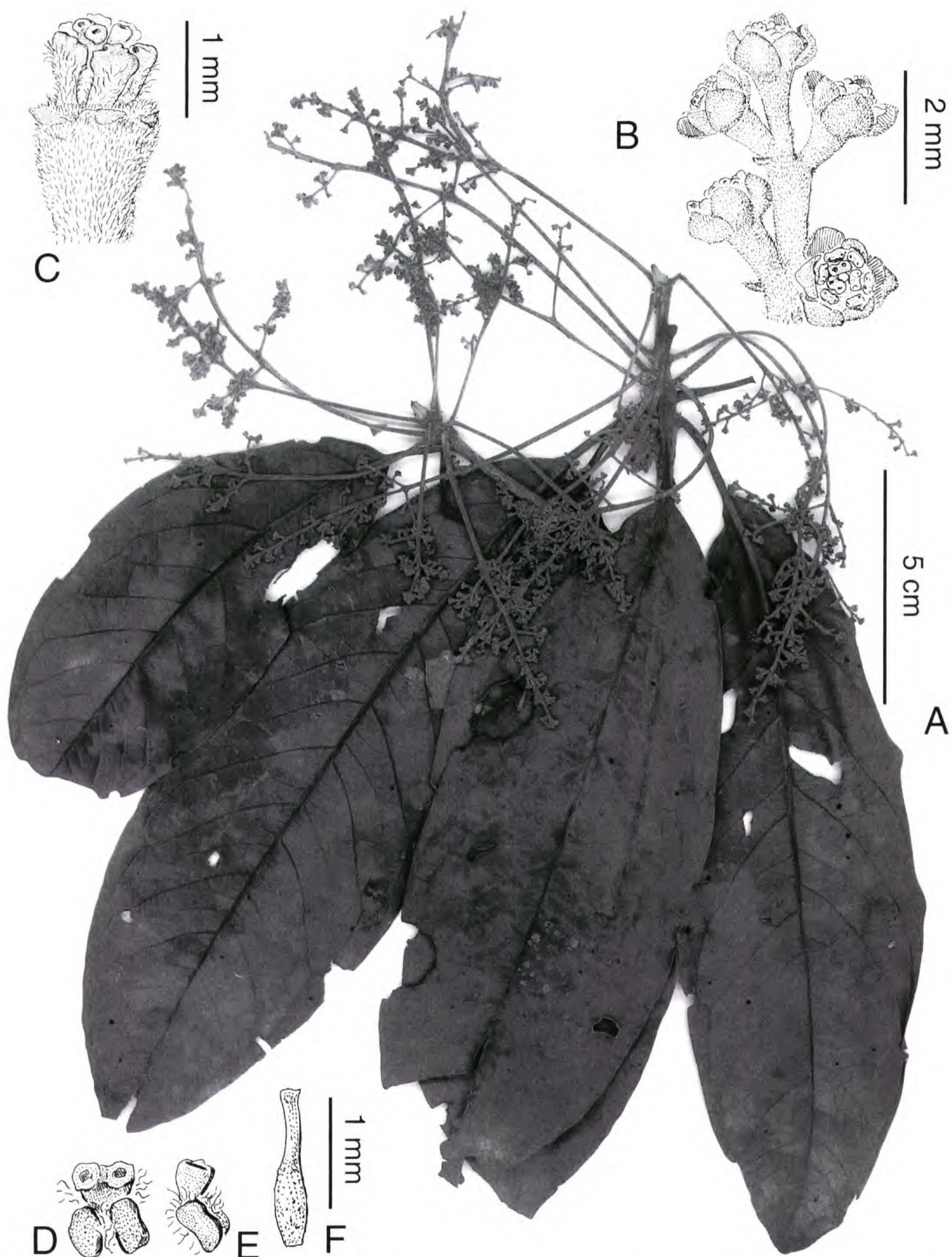


Figure 5. *Aniba vulcanicola* van der Werff. —A. Habit. —B. Detail of inflorescence. —C. Flower with tepals removed. —D, E. Inner stamen with basal glands. —F. Pistil.

dilatati, cupula 2-marginata, non profunda, fructu exserto, ellipsoideo,  $2.5 \times 2$  cm.

Tree, to 30 m tall. Twigs terete, glabrous or finely appressed pubescent appearing pale and contrasting

with the dark petioles. Terminal buds whitish, finely appressed pubescent. Leaves alternate, firmly chartaceous or coriaceous,  $11-20 \times 4-8$  cm, elliptic to broadly elliptic, the base acute or obtuse, apex

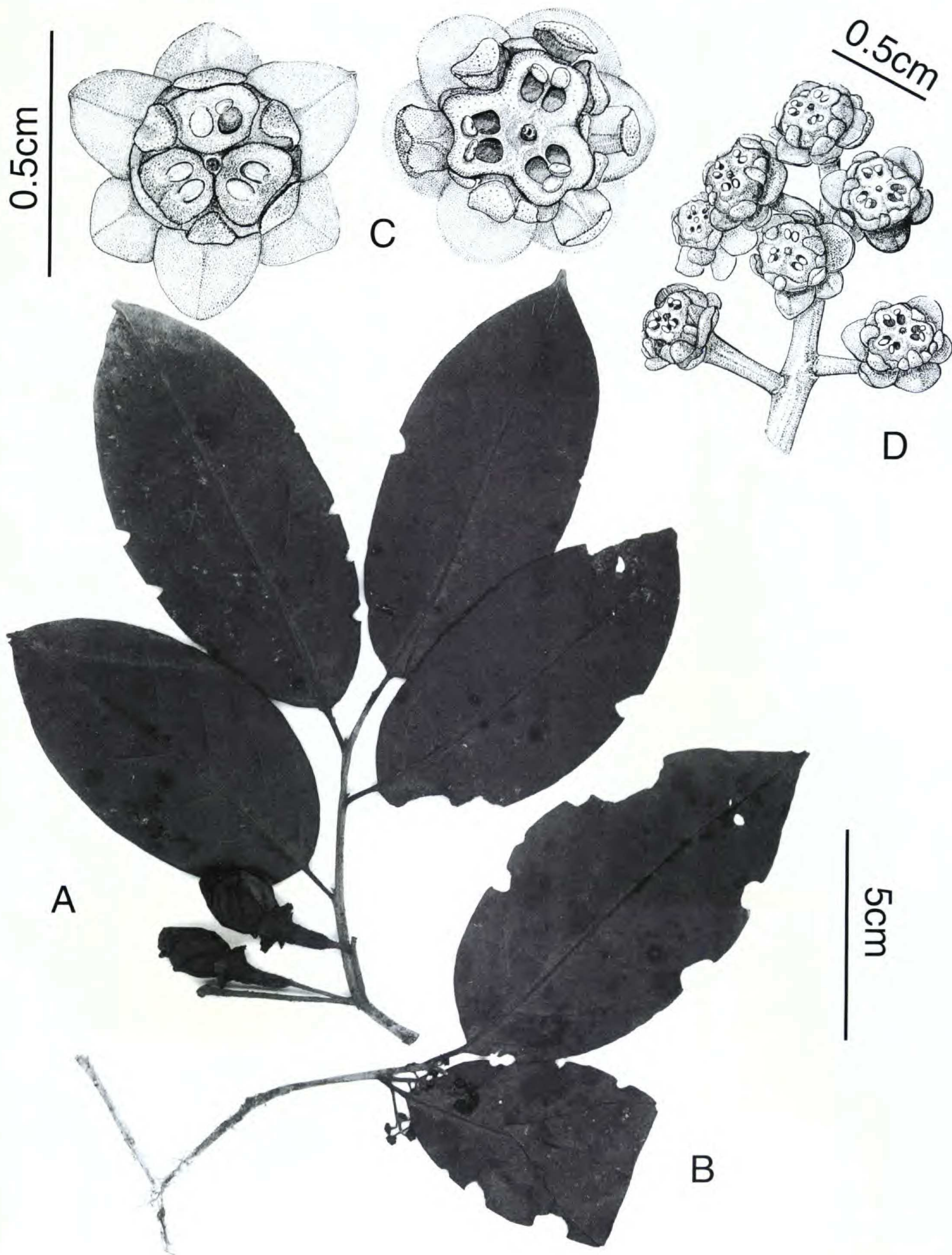


Figure 6. *Licaria applanata* van der Werff. —A, B. Habits with fruits and flowers. —C. Flowers, the younger one with staminodia pressed against stamens, the older one with spreading staminodia, showing the large glands. —D. Part of inflorescence.

acute or acuminate, the upper surface shiny and glabrous, the lower surface dull, darker green than upper surface (but see discussion), glabrous or with some scattered appressed hairs, lateral veins 5–6 on each side, immersed in upper surface, raised on lower surface. Petioles blackish, glabrous or with some appressed hairs, weakly canaliculate, ca. 1 cm long. Inflorescences in axils of bracts or normal leaves, to 8 cm long, finely pubescent, the hairs appressed or spreading. Flowers in vivo green, fragrant, in sicco black, glabrous, contrasting with the pubescent pedicels, depressed globose, 4–5 mm diam. when dry, 6–6.5 mm in pickled flowers, ca. 2 mm long. Tepals 6, glabrous on both surfaces, the outer three smaller than the inner three, almost circular, in young flowers erect, later spreading and finally recurved. Stamens and staminodes forming a pillowlike mass, ca. 4.5 mm diam. in pickled flowers. Androecium consisting of three fertile stamens, representing whorl III, each stamen with 2 apical locelli, the valves attached at the side of the locelli away from the pistil; stamens gradually narrowed toward the base, without a distinction between filament and anther; stamens tightly pressed together and appearing fused, but their margins, especially toward the center of the flower, with a row of reddish hairs; staminodia 6, representing the outer two whorls, as long as the stamens, those of whorl I broader than those of whorl II, all slightly pilose, in young flowers tightly pressed against the stamens, in old flowers bent backwards and conspicuous; glands at the base of the fertile stamens large, glabrous, about the size of the staminodia and alternating with these, glands and staminodia completely enclosing the fertile stamens. Pistil glabrous, the style exerted through a small pore between the fertile stamens, stigma minute. Receptacle glabrous inside, cupule red, shallow, without persistent stamens or staminodia, with double margin, the inner margin erect, small, the outer one spreading, 6-lobed, pedicel in fruit strongly swollen, pedicel and cupule funnel-shaped. Fruit ellipsoid, 2.5 × 2 cm, almost completely exerted, turning purple at maturity.

*Licaria applanata* clearly belongs to *Licaria* subg. *Armeniaca* Kurz, characterized by the locelli, which open away from the center of the flower. With exception of the common *L. armeniaca* and *L. debilis*, the species in this subgenus are rare and known from few fertile collections. *Licaria applanata* can be easily identified by the following characters: the large flowers (dried flowers 4–4.5 mm broad vs. ca. 2 mm in other species); the strongly depressed androecium (hence the epithet) with apical locelli; and asymmetrical obconic stamens which

gradually widen from their base and lack a distinct filament. Other striking features are the funnel-shaped cupules and the glabrous flowers, which contrast with the pubescent pedicels. In Kurz's (1983) key *L. applanata* would key near *L. pucheri*, which has much smaller flowers and a cylindrical cupule. However, *L. applanata* has a similar floral development as Kurz described for *L. pucheri*; in young flowers tepals are erect and staminodia are tightly appressed against the stamens, while in older flowers the tepals become spreading to reflexed, the staminodia bend backwards and become free from the stamens. In old flowers the stamens separate slightly from each other, but not to the degree seen in *L. pucheri*.

The common name for this species in Napo is Ishpingo. The wood is reportedly used for making furniture. According to Palacios, the juvenile leaves have a whitish cover. A waxy cover of leaf surface generally dissolves in alcohol and is not visible in alcohol-collected specimens. However, such leaves usually have a dull, dark brown color, as has *L. applanata*. Flowers that had been collected by Jaramillo, Palacios, and van der Werff, and then pickled, provided useful material for the description. In the related species with smaller flowers the pressing and drying process is not too damaging, but after pressing and drying most of the relatively large flowers of *L. applanata* were severely distorted.

*Paratypes*. COLOMBIA. **Antioquia**: Mun. Caramanta, 9.8 km from Caramanta toward Supia, *Betancur et al. 1134* (fr) (MO). ECUADOR. **Napo**: near Baeza, *Little & Campuzano 10* (fr) (MO, QAME); Canton Quixos, along Río Cosanga, *Palacios 6317* (fl) (MO, QCNE), *Palacios 6355* (fl) (MO, QCNE); Baeza, upper part of Río Machángara, *Palacios & Freira 5006* (fr) (MO, QCNE); slopes of Sumaco, km 40 road Hollin-Loreto, *Jaramillo 011* (MO, QCA); Pichincha, Reserva Florística Río Guajalito, *Jaramillo 13655* (pickled flowers MO, QCA).

**Mezilaurus triunca** van der Werff, sp. nov. TYPE: Peru. Loreto: Maynas, Iquitos, Allpahuayo, Estación Experimental IIAP, tree, 20 m, flowers green, *Vásquez et al. 14372* (holotype, MO; isotype, AAU, AMAZ, HBG, NY, QRS). Figure 7.

Arbor, ad 25 m. Ramuli minute puberuli, pilis erectis praediti, glabrescentes, cicatibus conspicuis foliorum deciduorum ornati. Gemma terminalis dense puberula. Folia alterna, ad apices ramulorum conferta, obovata, 30–48 × 9–12 cm, chartacea, basi acuta vel cuneata, apice rotundata vel plus minusve acuta, glabra; supra venatione immersa, subtus costa perelevata, nervis elevatis et venatione tertia paullo elevata; nervis 18–24 utroque costae latere. Petioli 4–8 cm longi, basi incrassati. Inflorescentiae axillares, ad 30 cm longae, minute puberulae, duplo ra-

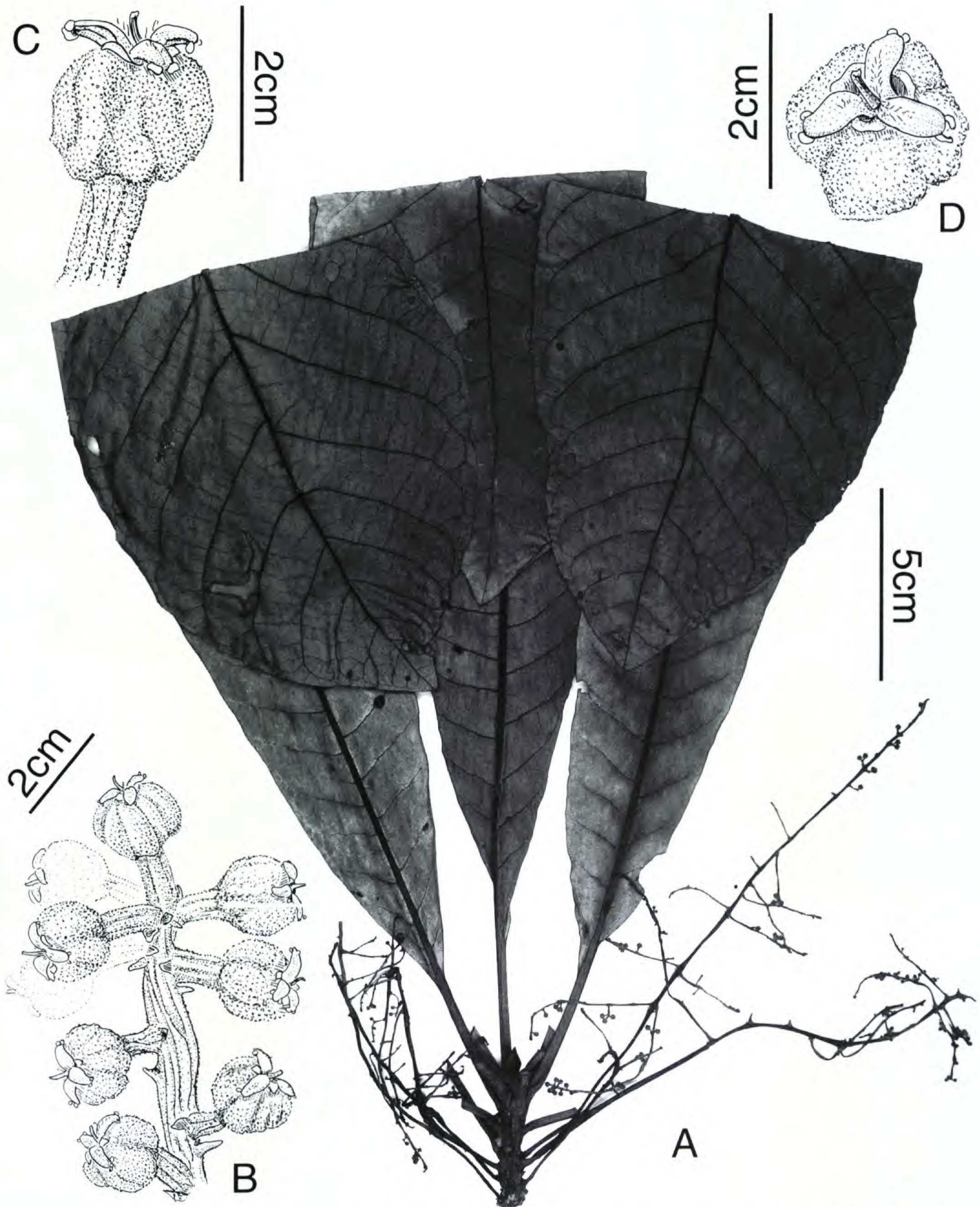


Figure 7. *Mezilaurus triunca* van der Werff. —A. Habit. —B. Detail of inflorescence. —C, D. Flower seen from aside and above.

comosae. Flores hermaphroditi, globosi, papilloso-puberuli. Tepala 6, inaequalia, 3 exteriora quam interiora breviora; stamina 3, 2-locellata, unciformiter exserta, filamento quam antheris latiori, ventrali pubescentia. Ovarium globosum, glabrum. Receptaculum quasi planum. Fructus ellipsoideus, ad 4 cm longus; cupula parva, plana.

Tree, to 25 m. Twigs minutely pubescent, the hairs erect, glabrescent, diameter of flowering twigs

ca. 5 cm below apex 7–10 mm, the tips of twigs with conspicuous scars of fallen leaves. Terminal buds densely puberulous. Leaves alternate, clustered near the tips of branches, obovate, 30–48 × 9–12 cm, chartaceous, the base acute or cuneate, the tip bluntly acute to roundish, glabrous on both surfaces or nearly so; venation (including midrib) on upper surface immersed, midrib prominently raised on low-

er surface, lateral veins raised, and tertiary venation weakly raised on lower leaf surface; lateral veins 8–24 on each side. Petioles with flat upper side and ridged lower side, 4–8 cm long, the base swollen. Inflorescences axillary, minutely puberulous, to 30 cm long, a double (very rarely triple) raceme, the flowers arranged in sessile cymes (frequently one or two flowers of a cyme broken off). Flowers perfect, (sub) globose, papillose-pubescent, 1.5–2.0 mm diam. (rehydrated). Tepals 6, unequal, the outer three smaller than the inner three; fertile stamens 3, 2-celled, the anthers hooklike exserted, the filament broad, ventrally densely pubescent, with 2 conical glands attached slightly above the base; staminodia 9, representing whorls I, II, and IV, stipitate, pubescent. Ovary globose, glabrous, 0.4 mm diam., style slender, 0.8 mm long. Receptacle shallow, glabrous. Fruit ellipsoid, green with white dots, to 4 cm long, seated on a very small, flat cupule.

*Flowers:* August–September; fruits May (immature), August.

*Mezilaurus triunca* is a very striking, but unusual, Lauracea due to its large leaves clustered at the tips of the branches, its long petioles with a swollen base and its hooklike exserted stamens. The three fertile 2-celled stamens, the small cupule, and the clustered leaves place this species in *Mezilaurus*. Only one other species, *M. mahuba* (Sampaio) van der Werff, has similar hooklike anthers. This species is the type species of the genus *Clinostemon*, but was recently transferred to *Mezilaurus* (van der Werff, 1987). *Mezilaurus triunca* differs from *M. mahuba* by its longer petioles (2–3 cm long in *M. mahuba*, 4–9 cm in *M. triunca*), glabrous lower leaf surface (*M. mahuba* has an indument of short, erect hairs) and distribution (*M. mahuba* is restricted to varzea forest in Pará and Amapá, Brazil; *M. triunca* occurs in terra firme forest near Iquitos, Peru). In mature flowers with exserted anthers it is difficult to see that the tepals are unequal. In young flowers with erect anthers still included in the flower the difference in size between inner and outer tepals is quite obvious, with the outer tepals less than half the size of the inner ones.

Kubitzki et al. (1979) reinstated the genus *Clinostemon* and placed two species, *C. mahuba* (Sampaio) Kuhlmann & Sampaio and *C. maguireanum* (Allen) Kurz, in it. They indicated the following differences between *Clinostemon* and *Mezilaurus*: staminodes present, stamens erect or bent downward, with or without glands, leaves hirsute beneath—*Clinostemon*; versus staminodes absent, stamens erect, without glands, leaves glabrous or hirsute—*Mezilaurus*. *Mezilaurus triunca* agrees in

all important characters with *M. mahuba* (presence of staminodes and staminal glands, recurved anthers). One might argue for the recognition of *Clinostemon* as a distinct genus based on these characters, but some *Mezilaurus* species with erect stamens (*M. thoroiflora*, *M. pyriformis*, and *M. duckei*) also have staminodes (6, not 9 as in *M. mahuba* and *M. triunca*). These three species are very similar to other *Mezilaurus* species in wood anatomy (Kubitzki et al., 1979). Thus, recognition of *Clinostemon* would be based only on the shape of anthers, the presence of 9, not 6 or 0, staminodes and the presence of staminal glands. In my opinion, this combination of characters is insufficient for the recognition of a separate genus, and I continue to consider *Clinostemon* a synonym of *Mezilaurus*.

*Paratypes.* PERU. **Loreto:** Maynas, Allpahuayo, Gentry et al. 56468 (st) (MO), Gentry et al. 65863 (st) (MO), Pipoly et al. 12230 (fl) (MO), van der Werff et al. 10227 (fr) (AAU, AMAZ, HBG, MO, QRS). **Maynas:** Santa Maria de Nanay, Vásquez & Jaramillo 12231 (fr) (AMAZ, MO).

**Ocotea rugosa** van der Werff, sp. nov. TYPE: Ecuador. Bolívar: in small patches of disturbed cloud forest along first 15 km of road Chillanes–El Tambo, elev. 2,400 m, van der Werff et al. 12429 (male fl) (holotype, MO; isotypes, AAU, GB, NY, QCNE, QRS, US). Figure 8.

Arbor dioica. Ramuli juniores tomentelli, vetustiores glabrescentes. Gemma terminalis tomentella. Folia alterna, elliptica vel elliptico-obovata, 12–24 × 6–14 cm, chartacea vel subcoriacea, rugosa, basi acuta vel obtusa, apice acuta vel breviter acuminata, supra glabra (juvenalia pubescentia), subtus pilis erectis praedita; venatione supra impressa, subtus insigniter elevata; nervis lateralibus 9–12 utroque costae latere, venatione brochidodroma. Petioli ca. 1 cm longi. Inflorescentiae axillares, paniculatae, ad 30 cm longae, sparse vel modice pubescentes. Flores unisexuales, subglabri vel pubescentes; tepala 6, aequalia, ca. 2 mm longa, intus glabra, margine plus minusve papillosa, in flore staminato stamina 9, 4-locellata, 6 exteriora introrsa, 3 interiora laterali-extrorsa, basi glandulis magnis praedita; staminodia nulla, pistillodium praesens, quam staminibus interioribus brevior; in flore pistillato staminodia 9, 3 interioribus basi glandulis duabus praeditis, pistillum ca. 2 mm longum, stigmatibus discoidea. Cupula parva, plana, pedicello incrassato; fructus ellipsoideus, omnino exsertus, 15 × 7 mm.

Small to medium-sized dioecious trees. Twigs terete or weakly ridged, the young parts tomentellous, but glabrescent with age. Terminal bud densely brown-tomentellous. Leaves alternate, evenly distributed along twigs, elliptic to elliptic-obovate, 12–24 × 6–10 cm, chartaceous to subcoriaceous, rugose, base acute or obtuse, apex shortly acuminate or acute, upper surface glabrous or, when young,

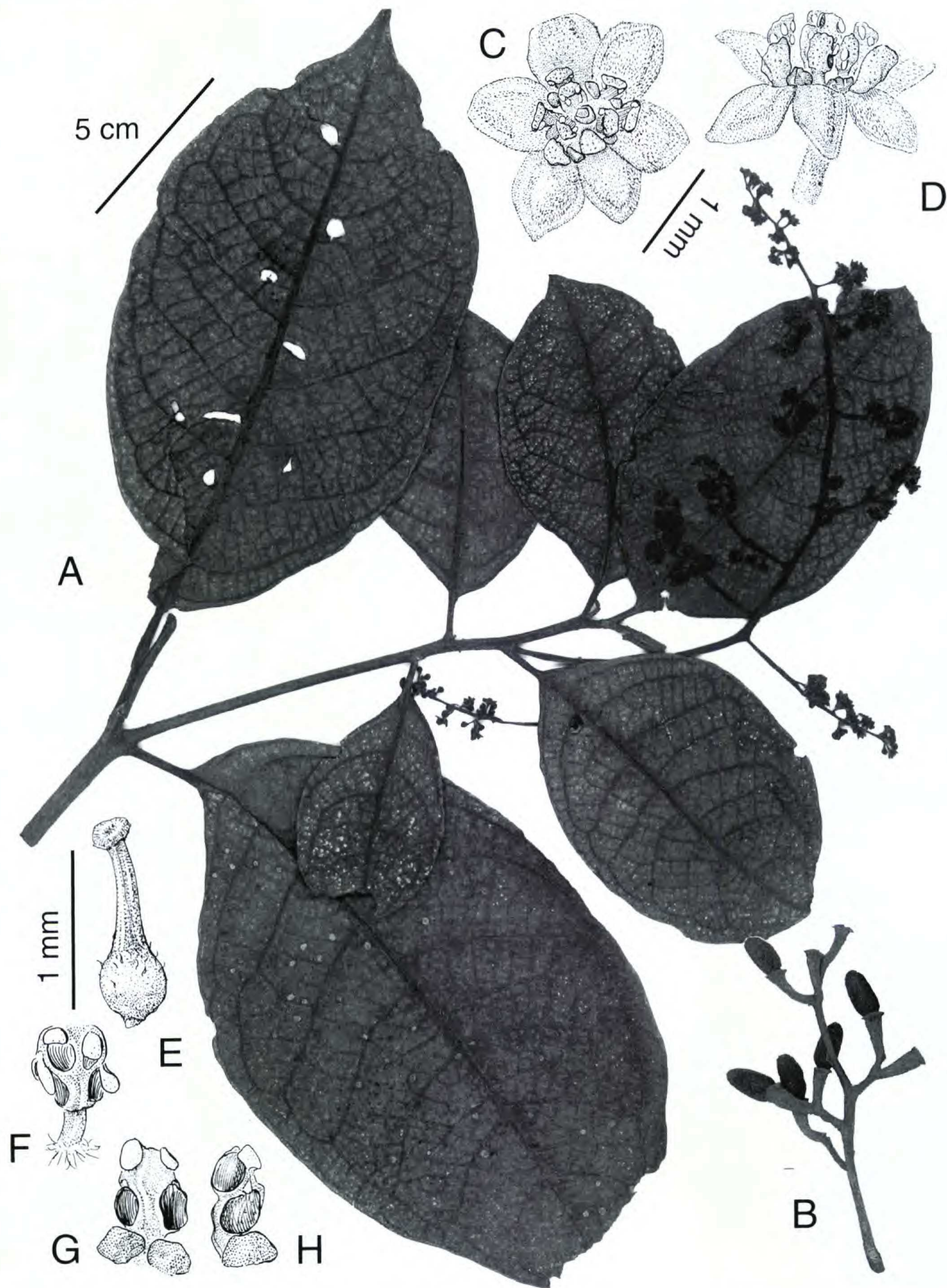


Figure 8. *Ocotea rugosa* van der Werff. —A. Habit. —B. Infructescence. —C, D. Flowers seen from above and aside. —E. Pistil. —F. Outer stamen. —G, H. Inner stamen.

with some erect or appressed hairs, these much denser and becoming tomentellous near the base and along midrib and major secondaries, lower surface with short, erect hairs, these denser along midrib and major veins; secondary and tertiary venation

impressed on upper surface and, together with midrib, prominently loop-connected in distal two-thirds of lamina. Petioles ca. 1 cm long. Inflorescences axillary, to 30 cm long, paniculate, sparsely to moderately pubescent with erect hairs, the flowers in

rather dense clusters. Flowers unisexual, subglabrous outside; tepals 6, equal, ca. 2 mm long, the inner surface glabrous or the margin papillose; male flowers with nine 4-celled stamens, the outer six with introrse cells, glabrous, the filaments very short, the inner three with lateral-extrorse cells, with two large glands at the base of the filaments of inner stamens; staminodia lacking; pistillode present, but shorter than the inner stamens; female flowers with nine small staminodia, glands present at base of inner staminodia, pistil ca. 2 mm long, glabrous, ovary as long as the style, stigma platelike, receptacle glabrous. In old flowers tepals frequently united at the base and falling as a unit. Cupule small, platelike, scarcely separated from the swollen pedicel, the fruit completely exserted, ellipsoid, 15 × 7 mm.

*Altitudinal range:* 1,800–2,600 m.

*Flowers:* July–September, fruits July–December.

*Ocotea rugosa* is only known from montane forests on the western side of the Andes in central Ecuador. The small cupule, swollen pedicel in fruit, and the relatively long, narrow fruits indicate a placement in the *Ocotea minarum* group. The erect pubescence on the lower leaf surface and lack of a wax coating of the lower leaf surface point to *O. ovalifolia* (Ruiz & Pavón) Mez as the closest relative. *Ocotea rugosa* differs from that species in its rugose leaves with the venation impressed on the upper and raised on the lower leaf surface, in the loop-connected lateral veins, and the glabrous inner surface of the tepals. The leaf base of *O. ovalifolia* is usually inrolled and decurrent (plane in *O. rugosa*), and *O. ovalifolia* has also a much denser indument on inflorescences and flowers. *Ocotea oocarpa* Mez & Sodiro, only known from the Ecuadorian Andes at ± 2,000 m elevation, has been placed in the *O. minarum* group, as well (Rohwer, 1986). This species differs from *O. rugosa* in having appressed, not erect hairs on the leaves and in not having its reticulation prominently raised.

The dioecious condition is not always obvious in *O. rugosa*. In the pistillate flowers there is no doubt that the staminodia are not functional, but in staminate flowers the pistillode is relatively well developed; however, a dissection shows that an ovule is lacking. Pickled staminate flowers show clearly that the pistillode remains hidden between the inner three stamens and is not accessible to pollinators.

*Paratypes.* ECUADOR. **Bolívar:** along road Chillanes–El Tambo, *van der Werff et al.* 12436 (female fl, young fr) (MO, QCNE), *van der Werff et al.* 12496 (young fr) (AAU, MO, QCNE, QRS). **Pichincha:** Reserva Florístico Río Guajalito near Chiriboga, *van der Werff et al.* 12216 (fr) (MO, QCNE, QRS), *Zak & Jar-*

*amillo* 595 (fr) (AAU, MO, QCA, QRS); without indication of province, but probably Bolívar: Balsapampa, W of Guaranda, *Rimbach* 203 (female fl) (MAD), 790 (MAD), *Rimbach* 827 (fr) (MAD), *Rimbach* 245 (male fl) (MAD).

***Persea fendleri*** van der Werff, sp. nov. TYPE: Venezuela. Aragua: P. N. Henri Pittier, *Steyermark* 91412 (fl) (holotype, NY). Figure 9.

Arbor, ad 15 m. Ramuli teretes, juvenales adpresse pubescentes, vetustiores glabrescentes. Gemma terminalis dense albido-pubescentis. Folia alterna, chartacea, 7.5–12 × 2.5–4.5 cm, elliptica, basi acuta vel attenuata, apice acuta, nervis lateralibus 7–10 utroque latere, supra glabra, costa impressa, nervis immersis, subtus costa nervisque elevatis, utrinque tenuiter reticulata. Petioli 1.5–2.5 cm longi. Inflorescentiae axillares, ad 5 cm longae, adpresse pubescentes. Flores virides. Tepala 6, (sub) aequalia, utrinque pubescentes, 2.5–3.0 mm longa; stamina 9, 4-locellata, 6 exteriora ca. 1.5 mm longa, locellis introrsis, filamentis pubescentibus antheris glabris; 3 interiora ad 2 mm longa, locellis extrorso-lateralibus, filamentis glandulis duobus praeditis; staminodia 3, ca. 1 mm longa, apice triangulari. Pistillum glabrum, ca. 2 mm longum, ovario globoso, 1 mm diametro. Fructus globosus, 1 cm diametro, basi tepalis persistentibus ornatus.

Tree, to 15 m tall. Twigs terete or slightly ridged, the young parts appressed pubescent, but soon becoming glabrous. Terminal bud densely white-pubescent. Leaves alternate, chartaceous, 7.5–12 × 2.5–4.5 cm, elliptic, base acute or attenuate, tip acute, lateral veins 7–10, arching upwards and fading out near the margin, upper surface glabrous, midrib impressed, especially in lower half of lamina, lateral veins immersed, the fine tertiary, reticulate venation raised; midrib raised on lower surface, lateral veins and fine reticulation weakly raised. Petioles slender, 1.5–2.5 cm long, with varying amount of appressed pubescence. Inflorescences axillary, ca. 5 cm long, the lateral branchlets once cymosely branched or flowers racemose, appressed pubescent, especially toward the flowers, bracts usually deciduous, if present linear, to 3 mm long. Flowers greenish. Tepals 6, equal or nearly so, pubescent on both surfaces, 2.5–3.0 mm long, broadly ovate; stamens 9, all 4-celled, the outer six ca. 1.5 mm long, with introrse cells, filaments pubescent, anthers glabrous, inner three to 2 mm long, with extrorse-lateral cells, filament pubescent, with two stalked glands near the base, anther glabrous; staminodia 3, ca. 1 mm long, the tip triangular, dorsally pubescent. Pistil glabrous, ca. 2 mm long, ovary globose, 1 mm diam., rather abruptly narrowed into the style. Fruit globose, 1 cm diam., the tepals persistent at the base.

*Persea fendleri* belongs to a rather small group of *Persea* species characterized by equal or subequal tepals that are pubescent on the inner surface and

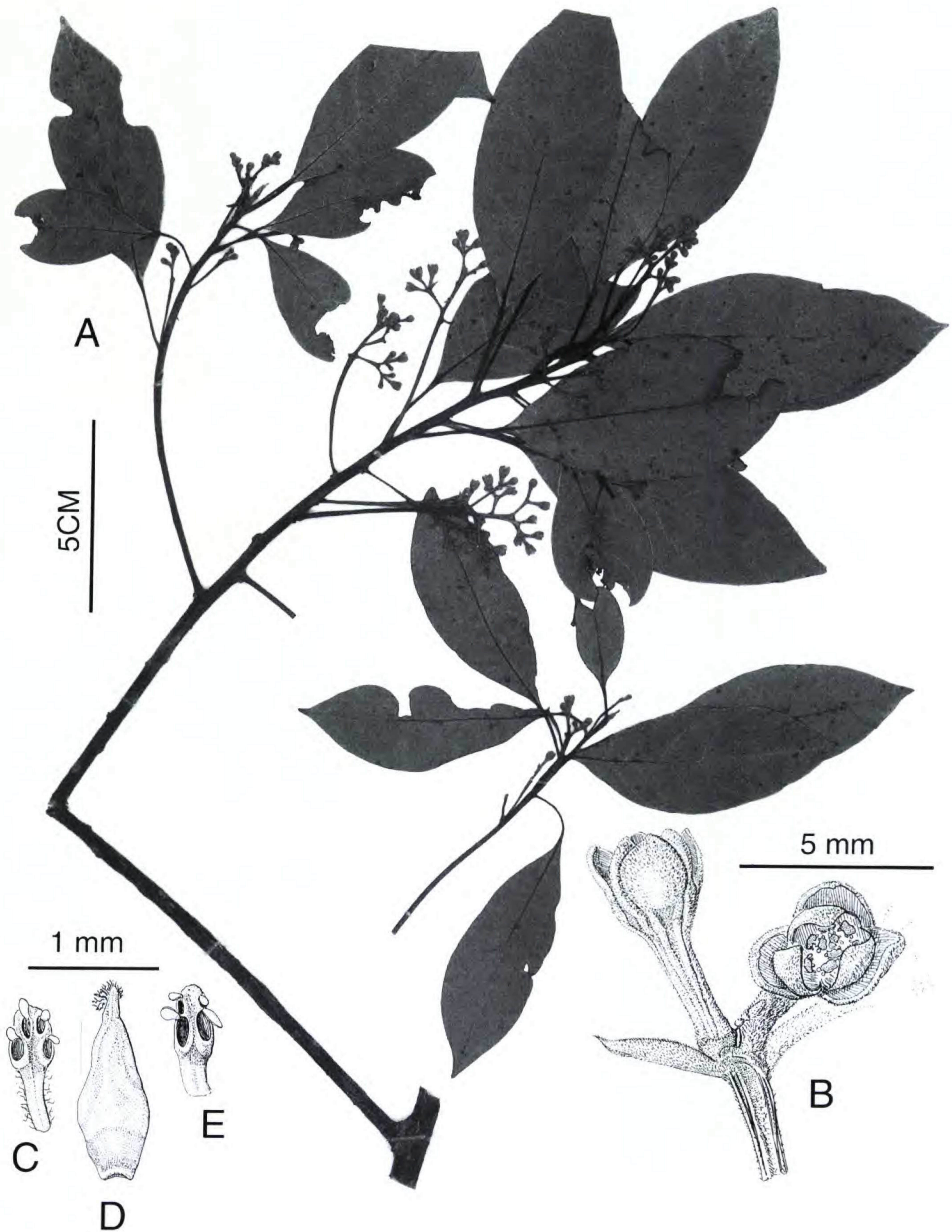


Figure 9. *Persea fendleri* van der Werff. —A. Habit. —B. Flowers. —C, E. Stamen. —D. Pistil.

persistent in the fruiting stage. This group cannot readily be placed in the infrageneric classification of *Persea* proposed by Kopp (1966), and the species usually have been treated as anomalous. Within this group, two growth forms can be recognized. In one the lateral branches of the twigs are alternate; *P.*

*fendleri* belongs to this group. In the other group, the lateral branches are whorled; usually three or four branches sprout from the same place. Usually the terminal bud is strongly swollen in this group of species and the leaves are more or less clustered near the tips of the branches.



*Persea fendleri* is an inconspicuous species, characterized by its chartaceous, small leaves, short inflorescences, and a rather sparse indument. The relatively long petioles, impressed midrib, and the fine reticulation on the upper leaf surface are characters shared with other species in this group. *Persea fendleri* is similar to some Old World *Persea* species and the Fendler collection was cited by Meissner (1864) as *P. indica* (L.) Sprengel, a species otherwise known from the Canary Islands. This Fendler collection is not cited in later revisions (Mez, 1889; Kopp, 1966). *Persea indica* differs from *P. fendleri* in its more densely pubescent flowers and leaves and its larger tepals (2.5–3.0 vs. 4–5 mm).

*Persea fendleri* is only known from the Cordillera de la Costa in Venezuela. There is a second, as yet undescribed species of *Persea* present in the coastal mountains of Venezuela. This species has larger, more coriaceous leaves, clustered leaves, and whorled branching. One collection of it was included in *P. rigens* Allen by Kopp (1966); a second, later collection is also in fruit. The fruits are depressed globose, not round as in *P. fendleri*. For the proper disposition of this species flowering collections are needed.

The collection Luteyn *et al.* 8326 was distributed as *Nectandra steyermarkii* Allen.

*Paratypes.* VENEZUELA. Prope Coloniam Tovar, Fendler 1096 (fr) (MO); border of Distr. Federal and Aragua, along road to Pto. Maya, Luteyn *et al.* 8326 (fl) (MO, NY).

***Persea nudigemma*** van der Werff, sp. nov. TYPE: Ecuador. Napo: Archidona, km 40 road Hollin–Loreto, tree, 20 m, Palacios & Iguago 4587 (fl) (holotype, MO; isotypes, AAU, GB, HBG, NY, QCNE, US). Figure 10.

Arbores ad 30 m. Ramuli teretes, glabri, ad apicem incrassati. Gemma terminalis parva, glabra. Folia alterna, ad apices ramulorum congesta, rigide chartacea, 8–18 × 3.5–7.5 cm, elliptica, basi apiceque acuta, subtus glauca, nervis lateralibus 8–10, supra glabra, costa nervisque immersis, reticulatione paullo elevata, subtus glabra, costa, nervis, reticulatione paullo elevatis. Petioli plani, glabri; 10–17 mm longi. Inflorescentiae ex axillis foliorum vel bractearum ortae, basi cicatricibus bractearum praeditae, paniculatae, puberulae, indumento flores versus densiore, ad 14 cm longae. Tepala 6, aequalia vel exteriora interioribus paullo breviora, 3–4 mm longa, omnia utrinque pubescentia. Stamina 9, 4-locellata, 6 exteriora locellis introrsis, filamentis ca. 1.5 mm longis, pubescentibus, antheris glabris, filamentis paullo latioribus, ca. 1 mm longis; 3 interiora ca. 2.6 mm longa, locellis lateralibus, filamentis dense pubescentibus, basim versus dilatatis, glandulis super basim affixis; staminodia 3, ca. 1.5 mm longa, dorsaliter pubescentia, apice triangularia. Pistillum 3 mm longum, stylo ovarium globosum aequante. Fructus ignotus.

Tree, to 30 m. Twigs slightly angled or terete, glabrous, swollen near the tip. Terminal buds small, glabrous. Leaves alternate, clustered near the tips of branches, the margins plane, stiffly chartaceous, 8–18 × 3.5–7.5 cm, elliptic, base acute, rarely obtuse, apex acute, the lower surface glaucous, lateral veins 8–10, upper surface glabrous, costa and lateral veins immersed, fine reticulation slightly raised, lower surface glabrous, with costa, veins, and reticulation slightly raised. Petioles flat, glabrous, 10–17 mm long. Inflorescences in axils of leaves or deciduous bracts, at the base with several scars of bracts, paniculate, the lateral branches once or twice cymosely branched, puberulous, more densely so toward flowers, to 14 cm long. Flowers yellowish. Tepals 6, ovate, equal or outer three slightly shorter, 3–4 mm long, erect at anthesis, pubescent on both surfaces. Stamens 9, all 4-celled, the outer six with introrse cells, the filaments ca. 1.5 mm long, pubescent, the anther slightly wider than the filament, glabrous, ca. 1.6 mm long; inner three stamens with lateral cells, ca. 2.6 mm long, filaments densely pubescent, widened toward the base, the glands attached slightly above the base; staminodia 3, ca. 1.5 mm long, dorsally pubescent, the tip triangular. Pistil 3 mm long, style as long as the globose ovary, this with a few hairs. Fruits unknown.

*Persea nudigemma* belongs to a small group of neotropical *Persea* species with equal tepals, these pubescent on both surfaces and persistent in the fruiting stage, swollen tips of branches, and more or less clustered leaves. Other members of this group are *P. rigens* Allen, *P. silvatica* van der Werff, *P. bernardii* Kopp, and possibly *P. cuatrecasasii* Kostermans. The latter two species have been described as having tomentose lower leaf surfaces; *P. silvatica* has very sparsely pubescent flowers, with the indument scarcely visible to the naked eye, while the indument on flowers of *P. rigens* is clearly visible. *Persea rigens* is a poorly known species; the type collection has only buds and the paratype has an infructescence, but no fruits. Kopp (1966) cited several fruiting collections under *P. rigens*, but did not describe the fruits. Some of these fruits were strikingly depressed globose (*Steyermark* 62459) and for lack of other distinct characters this fruit shape has become associated with *P. rigens* (Burger & van der Werff, 1990). However, collections from the type region (*Croat* 26475, *Stern & Chambers* 56, both MO) show that *P. rigens* has globose fruits. Thus, *P. rigens* remains an ill-defined taxon; the collections cited by Kopp (1966) from Guatemala, Venezuela, and Ecuador very likely do not belong here. *Persea nudigemma* differs from *P. rigens* in having glaucous lower leaf surfaces and in having

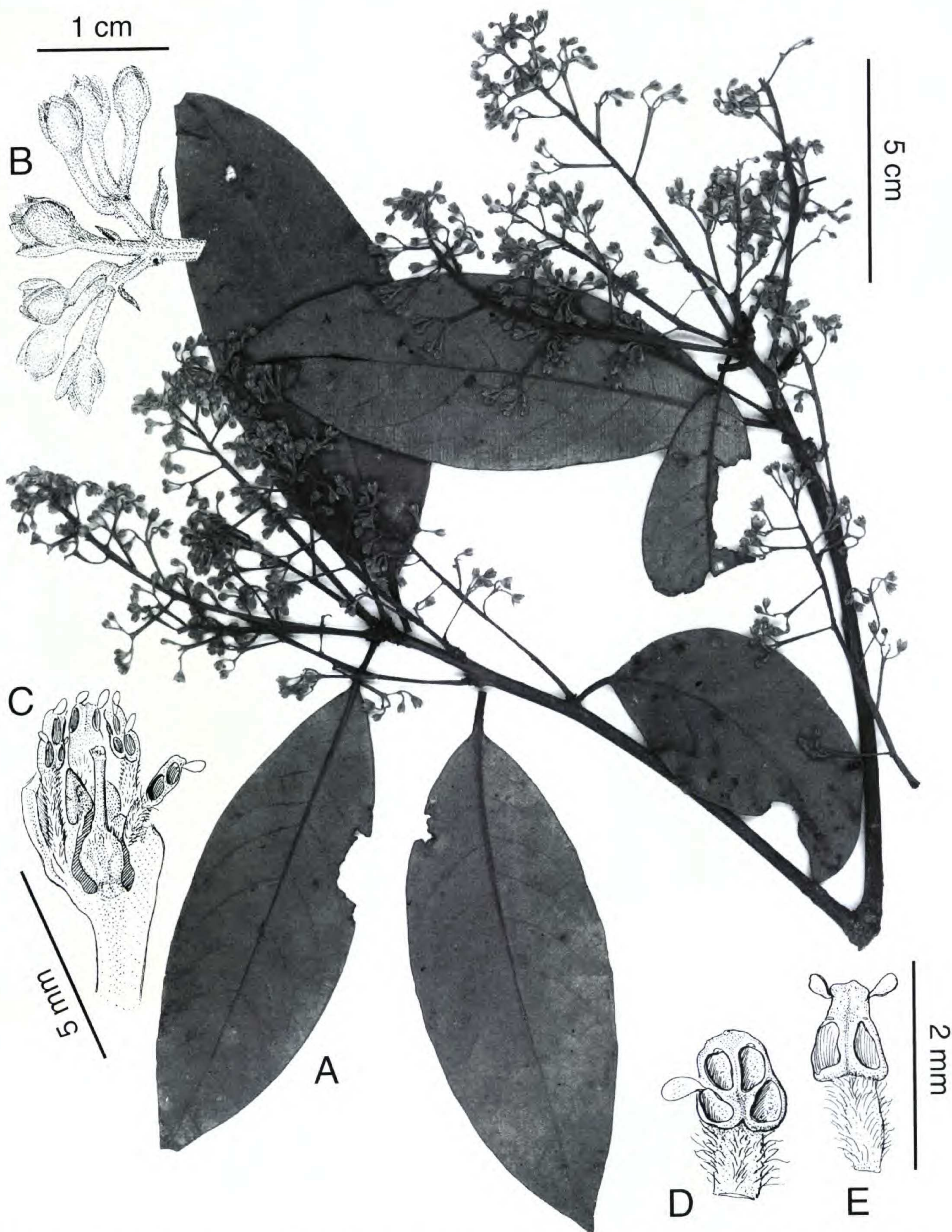


Figure 10. *Persea nudigemma* van der Werff. —A. Habit. —B. Part of inflorescence. —C. Flower in cross section. —D, E. Stamens.

less pubescent inflorescences and flowers. A sterile collection from Ecuador (Napó, km 2 carretera Cotundo-Coca, *Dodson et al.* 15099, MO) very likely belongs to *P. nudigemma*, as well.

Recent collections indicate that this group of *Persea* species is also present in Colombia and Peru. *Persea rufescens* Lundell, which is not well known to me, belongs to this species group.

*Paratypes.* ECUADOR. **Napo:** Archidona, km 40 road Hollin-Loreto, *Palacios & Iguago 4581* (fls) (MO, QCNE), *Neill et al. 9064* (fls) (MO, QCNE); Napo, Archidona, km 50 road Hollin-Loreto, *Palacios 4207* (fls) (MO, QCNE).

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